Algebra 2

Ch. 2 Handout 2.2

Linear Equations

Slope

**Slope is used to describe the measurement of the steepness of a straight line.

**Slope is the rate of change from one point to the next point on a line.

for a linear equation slope remains constant

**It tells how quickly a line is rising or falling.

Zero slope ⟷ a line that is horizontal

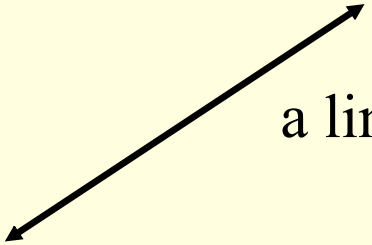
Undefined slope (no slope) ↕ a line that is vertical

Example:

The Building code for using asphalt shingles on roofs states that minimum pitch must be a rise of 4" for every 12" of horizontal distance (run) covered. Asphalt shingles are not to be use on roofs that have very little steepness. Builders check to see if the pitch (slope) of the roof is or 4:12 or $\frac{4}{12}$ or 4 to 12 before using asphalt shingles.

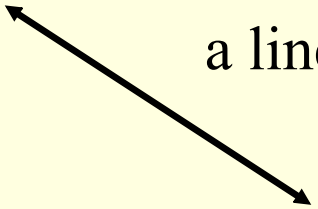
Builders need to know the pitch of a roof to determine which type of shingle will be appropriate for the roof.

Positive slope



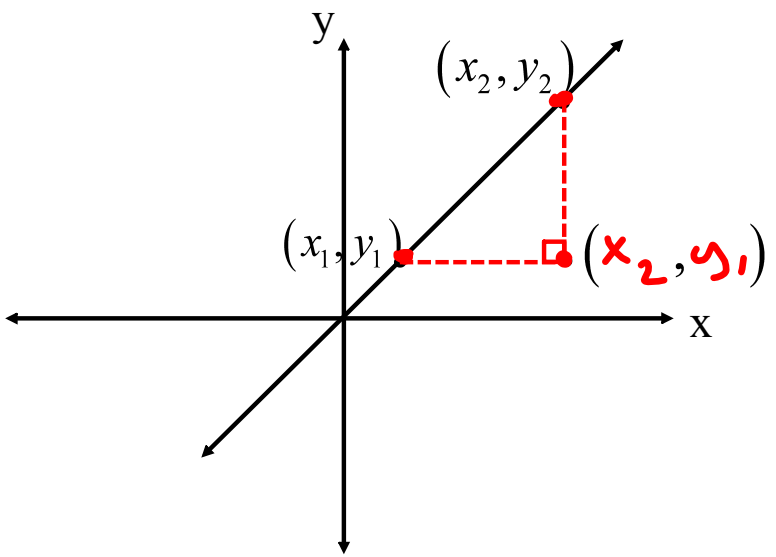
a line that rises from left to right

Negative slope



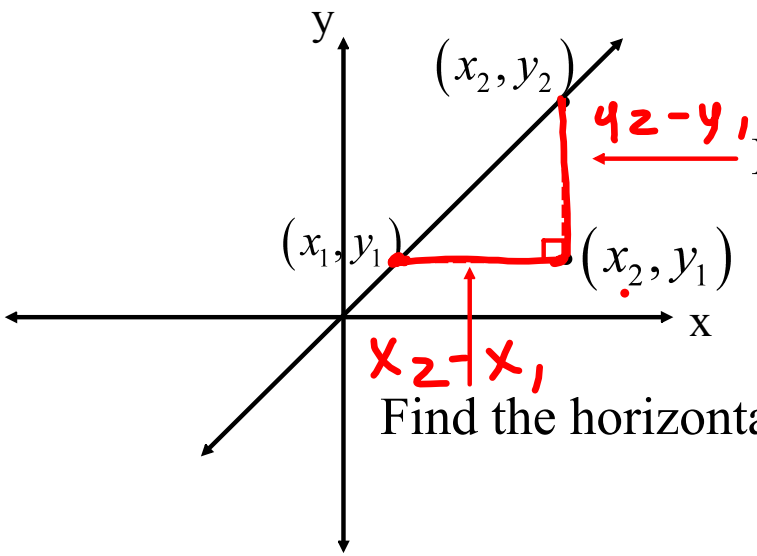
a line that falls from left to right

Slope



find the ordered pair

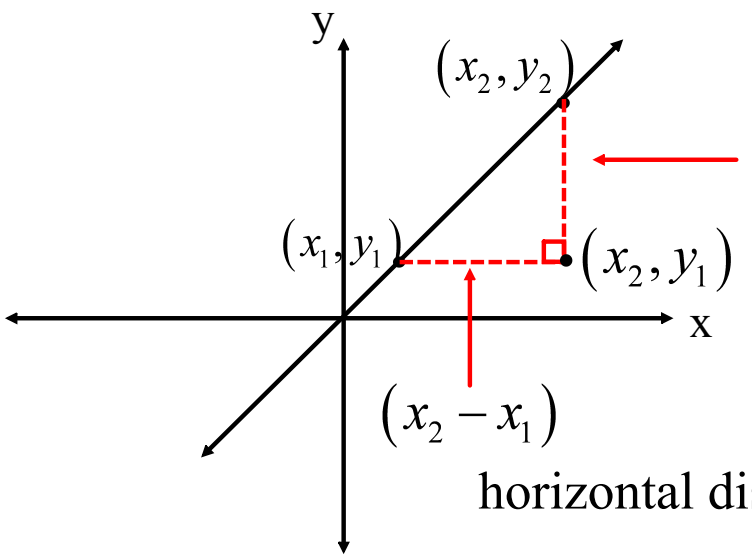
Slope



Find the vertical distance

Find the horizontal distance

Slope



$$\text{Slope (m)} = \frac{\textit{vertical change}}{\textit{horizontal change}} = \frac{\textit{rise}}{\textit{run}} = \frac{(y_2 - y_1)}{(x_2 - x_1)}, \textit{where } x_2 - x_1 \neq 0$$

Given 2 pts use slope formula to find slope

6. Find the slope of the line through the two points given

a) $\overset{x_1\ y_1}{(-2,7)}$ and $\overset{x_2\ y_2}{(8,-6)}$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{-6-7}{8-(-2)}$$

$$m = \frac{-13}{10}$$

b) $\overset{x_1\ y_1}{(-2,-2)}$ and $\overset{x_2\ y_2}{(4,2)}$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{2-(-2)}{4-(-2)} = \frac{4}{6}$$

$$m = \frac{2}{3}$$

6. Find the slope of the line through the two points given

c) $(3, 3)$ and $(-4, 3)$ — x_1, y_1 and x_2, y_2

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{3-3}{-4-3} = \frac{0}{-7}$

$\boxed{m = 0}$

(horizontal line)

d) $(2, 5)$ and $(2, -4)$ — x_1, y_1 and x_2, y_2

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{-4-5}{2-2} = \frac{-9}{0} = \emptyset$

m = undefined

(vertical line)

To find the slope of a given line you need to solve the equation for y.

* WRITE IN SLOPE-INTERCEPT FORM

Find the slope of the equation:

$$-7x+2y=8$$

$+7x \qquad +7x$

$$\frac{2y}{2}=\frac{7x}{2}+\frac{8}{2}$$

$$y=\frac{7}{2}x+4$$

$m: 7/2$

Find the slope of the equation:

$3x - 12y = 6$

$-3x \qquad -3x$

$\frac{-12y}{-12} = \frac{-3x}{-12} + \frac{6}{-12}$

$y = \frac{1}{4}x - \frac{1}{2}$

$m = \frac{1}{4}$

$4x = -y + 6$

$-6 \qquad -6$

$4x - 6 = -y$

$-4x + 6 = y$

$m = -4$

Find the slope of the equation:

$x = 5$

(vertical line)

m = undefined

$y = -\frac{1}{2}$

(horizontal line)

m = 0

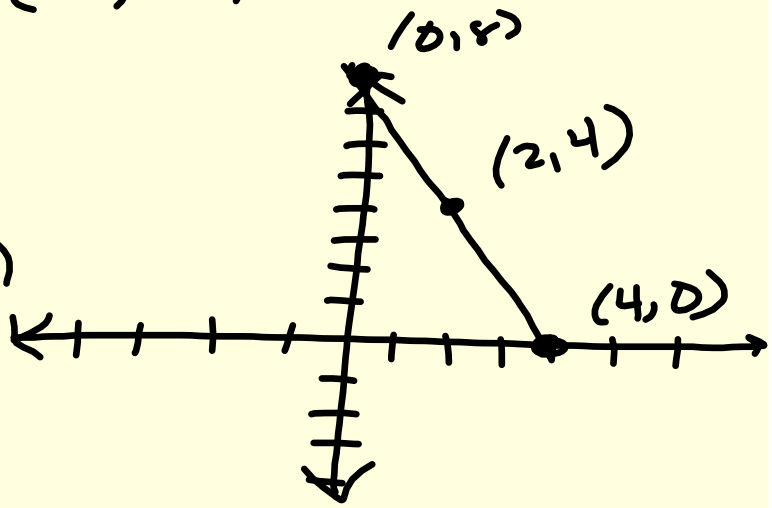
5. The equation $10x + 5y = 40$ how you can give $.40 change if you have only dimes and nickels. The variable x is the number of dimes, and y is the number of nickels. Graph the equation. Explain what the x- and y- intercepts represent. Describe the domain and the range.

(# of dimes, # of nickels)

(x, y)

x = # of dimes (independent variable)

y = # of nickels (dependent variable)



x-int: (4, 0)

$10x + 5y = 40$

$10x + 5(0) = 40$

$10x = 40$

$x = 4$

y-int: (0, 8)

$10x + 5y = 40$

$10(0) + 5y = 40$

$5y = 40$

$y = 8$

3rd: (2, 4)

$10x + 5y = 40$

$10(2) + 5y = 40$

$20 + 5y = 40$

$5y = 20$

$y = 4$

x-int (4,0) → 4 dimes, 0 nickels

y-int (0,8) → 0 dimes, 8 nickels

D: [0, 4]

R: [0, 8]

In 2003, federal vehicle emission standards allowed 4 hydrocarbons released per mile driven. By 2007, the standards allowed only 2 hydrocarbons per mile. What was the rate of change from 2003 to 2007?

Independent (x) Dependent (y) (slope)

(Year , hydrocarbons)

(2003, 4) (2007, 2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-4}{2007-2003} = \frac{-2}{4} = -\frac{1}{2}$$

Rate of change (m) = $-\frac{1}{2}$

Assignment

Pgs 67-70 11-19 odds, 33-37 odds, 43-65 odds